

EGU24-5328, updated on 24 Jan 2025

<https://doi.org/10.5194/egusphere-egu24-5328>

EGU General Assembly 2024

© Author(s) 2025. This work is distributed under the Creative Commons Attribution 4.0 License.



## Persistence and the practical predictability of surface temperatures

Emma Holmberg<sup>1</sup>, Steffen Tietsche<sup>2</sup>, and Gabriele Messori<sup>1,3</sup>

<sup>1</sup>Department of Earth Sciences and Centre for Natural Hazards and Disaster Science, Uppsala University, Uppsala, 75236, Sweden

<sup>2</sup>European Centre for Medium-Range Weather Forecasting (ECMWF), Bonn, 53175, Germany

<sup>3</sup>Department of Meteorology and Bolin Centre for Climate Research, Stockholm University, Stockholm, 11418, Sweden

Extreme temperature events can cause severe disruptions to society from negative health consequences to infrastructure damage. Early warning systems are a key element in the mitigation of such impacts, with literature highlighting the potential societal benefit of information from sub-seasonal forecasts. We investigate the relationship between the persistence of an atmospheric state and the practical predictability of surface temperatures focusing on medium to extended range time scales. Persistence is assessed objectively leveraging techniques from dynamical systems theory whilst practical predictability is defined in terms of the forecast error in surface temperature. Atmospheric persistence provides potential value for the practical predictability of temperature in some cases with the results varying depending on season and location. Wintertime temperature forecasts at lead times up to three weeks, and cold spell forecasts up to two weeks in lead time are highlighted as cases where persistence appears to show an association with practical predictability.